Space Weather Forecast

Issued on Friday, 13 October 2023 at 13:03 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Overdue fast wind now arriving, restored chance of Minor Geomagnetic Storm G1. Rising chance of Moderate-class flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has greatly reduced in the past 24 hours, with few well-defined flares and with the X-ray background reducing. The peak flare of the period was a low Common class from an eastern solar hemisphere sunspot at 12/1232UTC, although this was essentially unremarkable against the similar background.

There are now up to six sunspot regions on the facing side of the Sun, although another partial satellite imagery outage as of 13/0445UTC is again hampering analyses (although it was restored at the time of issue of this document). This is perhaps especially relevant for diagnosing the arriving eastern solar horizon, where numerous returning regions are anticipated. Available lower resolution imagery trends suggest the main tendencies have been for spreading and fading of intermediate spots in some of the larger groups on the Sun, which tends to favour a decreased flare risk.

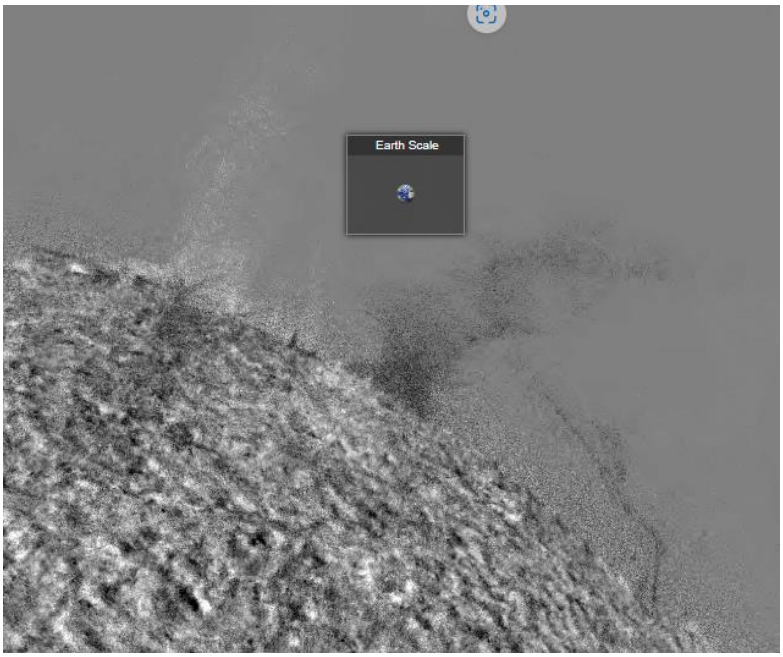

Figure 1: Helioviewer.org-derived extreme UV 2-hour integrated difference imagery ending 12/1800UTC. This shows the semi-circumpolar filament lift off in the western hemisphere during the late UTC afternoon of 12 October. The ejecta may have bifurcated, with the white portion being directed towards Earth but above and ahead of the track of its orbit. Earth shown for scale.

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The near centre-disc flare and extreme UV dimming in the preceding 24-hour period produced no Coronal Mass Ejection (CME). The current reporting period showed a large, high latitude western solar hemisphere 'filament lift off' (an arc of plasma launched into interplanetary space) through much of the UTC afternoon. This resulted in a large CME becoming visible into the past UTC overnight period. This has been analysed as a miss above and ahead of the track of the Earth's orbit. Other events in the period included a minor narrow CME from the vicinity of a sunspot group on the western solar horizon, which has again been analysed and is expected to pass well ahead of the Earth to no effect.

Solar Wind / Geomagnetic Activity: Solar winds started in a slow regime, but showed a very marked progression into an increased density region, termed a 'Co-rotating Interacting Region' (CIR) that often precedes stronger coronal hole fast wind regimes. This feature developed in earnest from around 13/0300UTC. This is most likely to be the substantially delayed fast wind.

The solar wind speed rose within background levels in the 24 hours, with much of this occurring after 13/0300UTC. The associated solar wind density change was more marked still, rising from background to become elevated with the CIR. The associated magnetic field showed a similarly increasing magnitude signal, rising from a stable background to elevated levels, peaking after 13/0800UTC, although the north-south component was fortunately almost purely co-aligned with Earth's field to limit geomagnetic activity (to this point).

The net effect of the above solar wind measures was initially quiet geomagnetic activity, but rising in the current UTC morning, albeit remaining below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a slightly rising Chance of Moderate-class flares through the four-day period as a result of eastern solar hrozion arrivals into the UTC weekend.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast.

The current CIR is likely to lead into the overdue fast wind. Its character remains to be seen, however tentatively there is a restored chance of Minor Geomagnetic Storm G1 in the first 24 hours, probably becoming mainly Quiet again as the UTC weekend progresses. By the new working week a second fast wind may arrive, again leading to a chance of further G1.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	25	5	1	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	40	40	40
Very Active	R3 to R5 X	No	1	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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